**Copied from Precalculus syllabus**

**Student Learning Outcomes**

**Chapter P – Prerequisites** (Week 1 & 2)

* Review Real numbers
* Use interval notation
* Utilize the Cartesian plan to graph functions and relations
* Graph and solve linear equations
* Review slope, forms of lines and perpendicular/parallel traits
* Solve equations graphically
* Simplify and manipulate complex numbers
* Solve Absolute value and quadratic inequalities

**Chapter 1 – Functions and Graphs** (Week 3 - 6)

* Use numerical, algebraic, and graphical models to solve problems and will be able to translate from one model to another.
* Represent functions numerically, algebraically, and graphically.
* Determine the domain and range for functions.
* Analyze function characteristics such as extreme values, symmetry, asymptotes, and end behavior.
* Recognize graphs of twelve basic functions, determine domains of functions and combine the twelve basic functions and combine the twelve basic functions in various ways to create new functions.
* Build new functions from basic functions by adding, subtracting, multiplying, dividing, and composing functions.
* Define functions and relations parametrically
* Find inverses of functions and relations
* Algebraically and graphically represent translations, reflections, stretches, and shrinks of functions and parametric relations.
* Identify appropriate basic functions with which to model real-world problems and be able to produce specific functions to model data, formulas, graphs, and verbal descriptions.

**Chapter 2 – Polynomial, Powers and Rational Functions** (Week 7 - 10)

* Recognize and graph linear and quadratic functions, and use these functions to model situations and solve problems.
* Sketch power functions
* Graph polynomial functions, predict their end behavior and find their real zeros using both a grapher and an algebraic method
* Divide polynomials using long divisions or synthetic division
* Apply the Reminder Theorem, Factor Theorem and Rational Root Theorem
* Find upper and lower bounds for zeros of polynomials
* Factor polynomials with real coefficients using factors with complex coefficients.
* Describe the graphs of rational functions, identify horizontal and vertical asymptotes, and predict the end behavior of rational functions.
* Solve equations involving fractions using both algebraic and graphical techniques and identify extraneous solutions.
* Solve inequalities involving polynomials and rational functions by using both algebraic and graphical techniques.

**Chapter 3 – Exponential, Logistic, and Logarithmic Functions** (Week 11 – 15)

* Evaluate exponential expressions
* Identify and graph exponential and logistic functions
* Use exponential growth, decay and regression to model real-life problems
* Convert equations between logarithmic form and exponential form.
* Evaluate common and natural logarithms
* Graph common and natural logarithmic functions.
* Apply the properties of logarithms to evaluate expressions, graph functions, and re-express data
* Apply the properties of logarithms to solve exponential and logarithmic equations algebraically and solve application problems using these equations.
* Use exponential functions and equations to solve business and finance applications related to compound interest and annuities.

**Chapter 8 – Analytic Geometry in Two and Three Dimensions** (Week 16 - 18)

* Graph a parabola and identify its vertex, focus and directrix
* Graph an ellipse and identify its center, vertices and foci
* Graph a hyperbola and identify its center, vertices, foci and asymptotes
* Find the angle of rotation of conics
* Identify the graph of rotated conics

**Chapter 4 – Trigonometric Functions** (Week 19 – 22)

* Covert between degrees and radians
* Find the measure of the intercepted arc of a circle
* Solve problems involving angular speed
* Define the trigonometric ratios using the lengths of the sides of a right triangle
* Find the trigonometric values of angles in right triangles
* Find the exact trigonometric values of special angles
* Identify the sign of each trig function based on the quadrant
* Solve problems involving the trigonometric functions of real numbers and the properties of sine and cosine as periodic functions.
* Find reference angles and use to evaluate expression
* Develop the wrapping function
* Use trigonometric identities to simplify an expression
* Find the period, amplitude, frequency and phase shift of the trigonometric functions
* Generate the graphs of the trigonometric functions
* Relate the concept of inverse functions to trigonometric functions.
* Apply the concepts of trigonometry to solve real world problems.

**Chapter 5 – Analytic Trigonometry**  (Week 23 - 26)

* Use the fundamental identities to simplify trigonometric expressions and solve trigonometric equations.
* Decide whether an equation is an identity and to confirm identities analytically
* Apply sum, difference, multiple, power reducing and half-angle identities
* Use the computational applications of the Law of sines to solve a variety of problems.
* Apply the Law of cosines to solve acute and obtuse triangles.
* Determine the area of a triangle in terms of the measures of the sides and angles.

**Chapter 6 – Applications of Trigonometry** (Week 27 - 31)

* Find the components, magnitude and direction of a vector
* Find the horizontal and vertical components of a vector
* Add, subtract and scalar multiply vectors
* Find the dot product of vectors
* Find the angle between 2 vectors
* Find the projection of one vector onto another
* Define parametric equations and graph curves parametrically
* Solve application problems using parametric equations
* Convert points and equations from polar to rectangular coordinates and vice versa
* Graph polar equations and determine the maximum r-value and the symmetry of a graph
* Transform complex numbers into trigonometric form
* Multiply and divide complex numbers in trigonometric form
* Use DeMoivre’s Theorem to find roots

Optional (If time allows)

**Chapter 7 – Systems and Matrices** (Week 32 - 35)

* Solve systems of equation graphically and algebraically
* Solve applications involving systems of equations
* Find sums, differences, products, and inverses of matrices
* Solve systems of linear equations using Gaussian elimination, and reduced row echelon form of matrix or an inverse matrix
* Decompose a rational expression into partial fractions